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Professor Johnson

with D Emerson's best

regards.



ADDRESS

DELIVERED BEFORE

THE SOCIETY FOR PROMOTING AGRICULTURE

OF THE

COUNTY OF PHILADELPHIA,

AT THEIR

ANNUAL EXHIBITION, AT THE RISING SUN TAVERN,

OCTOBER 6, 1848,

BY

GOUVERNEUR EMERSON, M.D.

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TOGETHER WITH

The Reports of Committees.



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REPORT

OF THE

COMMITTEE OF ARRANGEMENT.

THE Philadelphia Society for promoting Agriculture held their Annual Exhibition at the Rising Sun village, on the 5th and 6th inst.

The system adopted last year, of making a small charge for entrance to the Exhibition, was pursued with beneficial effects on this occasion, the receipts amounting to a sum that will aid the Society in increasing its premium list, and which exhibits the interest felt in the community for the progress of the usefulness of the Society.

The weather, on both days of the Exhibition, was delightful, and an unusual number of visitors were on the ground, examining with care and apparent satisfaction the large number of cattle of the various favourite breeds, the perfectly formed sheep, and the greatly improved and highly interesting display of hogs. The rich and extensive display of agricultural produce, vegetables and fruits, attracted a large share of attention, and the contributors received as they merited, the highest commendation. The display of agricultural implements added fresh laurels to the judgment and ingenuity of our countrymen.

The second day of Exhibition attracted an unusual number to the ground to witness the skill of the ploughman, the excellence of the ploughs, and to listen to the admirable address of our distinguished fellow member, Dr. G. Emerson. The attention of the large number of visitors who surrounded the speaker's stand, was fully compensated by the clear and forcible ideas advanced by the speaker. The Address throughout received, as it merited, the united approbation of all who heard it. The Committee of Arrangement recommend that the thanks of the Society be tendered to Dr. G. Emerson, for his admirable, scientific and practical agricultural Address, delivered before the Society on the 6th inst., and that the Society have copies published for distribution.

The members of the Society dined together on each day, and on the second day were honoured by the presence of a number of gentlemen of distinction, friends of agriculture.

The arrangement of the grounds, and the superior accommodations afforded the Society by the proprietor, Mr. James Hammill, received the entire approbation of the Committee of Arrangement.

The Exhibition closed, after having afforded opportunities of improvement to the agriculturalist, and general satisfaction to all.

A full description of stock, implements of husbandry, &c. will be found in the accompanying reports of the judges.

SAML. C. FORD, *Chairman*,
AARON CLEMENT,
JOHN S. HAINES,
ANTHONY T. NEWBOLD,
JOHN LARDNER.

Philadelphia, October 30th, 1848.

ADDRESS.

THE trite saying of "knowledge is power," applies to agriculture as well as to every other human pursuit. The advantages derived from the discovery of new facts by means of which the products of the soil may be obtained at less cost than before, give to those facts all the value and importance due to the invention of new mechanical powers.

Two of the most essential callings of civilization, namely, agriculture and medicine, have existed from time immemorial, with, comparatively, little aid from the exact sciences. Conducted mainly upon the principles of experience and observation, they have, in some countries at least, attained to as much perfection as these guides to knowledge can carry them. But both pursuits stand upon the same platform in relation to the obstacles in their way, having to deal with subjects endowed with the mysterious principle of life, the phenomena of which are veiled in so much obscurity. It is not difficult to assign reasons why agriculture and medicine have remained so far in the rear, whilst other sciences have advanced so far. Those subjects which appeal most directly to the external senses, and can be most readily grasped by the powers of common observation, will naturally be the first brought to perfection.

The mechanic may well boast of the great things he has achieved on the surface of the globe, and the astronomer proudly point to the starry heavens and to the new worlds he has there discovered and measured and weighed. But great and wonderful as have been the achievements of these, the subjects with which they deal are far less complex and difficult to seize by the mind than the phenomena of animal and vegetable life. To obtain any thing like accurate knowledge upon these intricate matters, new powers of observation have to be put forth, new agents, new instruments and modes of research discovered. I make these remarks in self defence, well knowing the slurs to which we have been exposed from those unacquainted with the difficulties attending the study of the processes carried on in living subjects.

Gentlemen, I have not come here to fatigue you with disquisitions upon abstract science. I know that on such an occasion as the present it would be greatly out of place to do so. Indeed, the time allowed us will admit of little more than a mere reference to one or two of the very numerous facts which science has recently sent forth, bearing upon our pursuit. Some of you are perhaps already ac-

quainted with them. If, however, I succeed in imparting any new light to those who need it, or impressing old information with new importance, I shall consider the time I detain you not lost. My chief object is to prove that modern science has placed us in possession of knowledge which has enabled us to comprehend much in regard to the nature and requirements of animals and vegetables formerly inexplicable. And, what is still more to our immediate purpose, it has placed us in possession of facts which can be put to profit as so much capital. If the first view, that of gratifying a laudable curiosity, is not sufficient to awaken your attention, I shall be disappointed if the last fails to make a proper appeal to your consideration.

It is to chemistry that we are recently indebted for many greatly needed disclosures; for discoveries which have unfolded to us the intimate composition of substances and their relations with each other. Although many chemical processes may have been previously carried on and made subservient to various useful purposes, still chemistry is emphatically a new science, created within a century, during the first half of which it was comparatively in a rude state. Even within a very few years the number of new substances it has revealed to us, the array of novel names and symbols it has introduced, are so great that the student of some fifteen years ago, who had not kept himself well posted up, would be almost as much puzzled to master a page of a new chemical work, as he would one of the incomprehensible productions of alchemy written in the dark ages. Modern chemical investigations have not only made us acquainted with the constituents of earth, air and water, in all the forms presented by nature, but its explorations have furnished most remarkable discoveries relative to the composition of the solids and fluids composing animal and vegetable fabrics. The completeness which characterizes chemical processes, the exactness with which weights and proportions numerically expressed are made to test every experiment and show every atom gained or lost in the substances experimented upon, have gone far to banish vague hypotheses and fortuitous results from the field of inquiry.

The researches into the nature and composition of *vital products*, or materials gathered together under the mysterious influence of the living principle, constitute a separate department called *organic chemistry*. The zeal and successful labours of a few almost inspired men, the chief among whom is Dr. Liebig, have, within a very short time, furnished a vast amount of results in this new province of knowledge, so that there scarcely remains a product of organized existence which has not been separated into its primary constituents, and the nature and affinities of these with other bodies strictly determined. By such exact researches into the composition of vegetable substances, soils, manures, atmospheric elements and agencies administering to growth and development, chemistry has brought agriculture to assume the character of a science. By similar investigations into the composition of the food and egesta of animals, and the changes these undergo through processes carried on in living

animal bodies, chemistry has thrown new light upon physiology, and holds out the fairest prospects of elevating medicine to the rank of an exact science.

It is now known with much precision what plants and animals are composed of, what food they require from the soil for their growth and proper development, what they respire from the atmosphere. With these new and most important accessions to knowledge, the book farmers, a hitherto much derided class, take the field with great odds in their favour, in competition with those whose want of information compels, or whose indisposition inclines them to adhere to old usages. We do not doubt that some who desire to rank as scientific farmers may still contrive to render themselves highly ridiculous. But we feel the fullest assurance that the best instructed and most judicious book farmers will take the lead, as being able to produce the best results of agriculture with the least expenditure.

For myself, two considerations urge me to keep up as well as I can with the progress of scientific discovery. I consider it a professional duty to secure all the facts turned up, capable of being made available to the healing art. Having, at the same time, a few paternal acres in the country, it is my interest to lay hold of every new discovery that can be put to profit in the improvement of agriculture. There would, indeed, seem to be a natural compatibility between the callings of physician and farmer.

I trust I shall be pardoned for thus bringing to your notice the capabilities of my profession to be of service to the community in more ways than one. The physician is, or ought to be, a man of sound education and extensive scientific knowledge, as such attainments not only qualify him to be of most service professionally, but are of incalculable use in enabling him to diffuse sound information among the vast numbers with whom he is placed in contact by the nature of his vocation. The country physician is peculiarly the active missionary of useful knowledge, especially on subjects connected with natural science and husbandry. The extent of valuable information thus propagated throughout the land by its thousands of physicians is seldom thought of, and too little appreciated.

Upon the subject of the availability of scientific information to practical husbandry, I wish to prove to you that, in asserting its claims, I am not indulging in mere fanciful conceits. In making my positions good, I shall be compelled, even at the risk of appearing egotistic, to place before you some account of agricultural proceedings with which I have been some years engaged.

The acres to which I have referred, consist of alluvial lands on the Delaware peninsula, too far from the sources of the ordinary bulky manures afforded by cities and large towns, to obtain supplies at a reasonable rate. The fields, like most others in the old settled parts of Delaware, Maryland, and Virginia, have been tilled by successive generations with little or no manure, except small patches here and there from the scanty supply of the barn yard. Though highly fertile at first, the soil, as a matter of course, became exhausted and unproductive through such a long course of scourging tillage, in which

the largest portion of the crops were either shipped off, or scattered and wasted. Things grew worse, from year to year, until at length the crops hardly compensated for the seed sown, and labour applied. An examination of the soil showed abundance of black mould, and conveyed a fallacious idea of productiveness. Lime, the universal remedy, was applied at considerable expense, but with so little advantage that it was evident something else was wanting. Whilst considering what this something else should be, the developments of organic chemistry taught me, among other interesting facts, that ripened grains contained phosphate of lime, an ingredient which it could only derive from the soil.

It was easy to conceive that the crops of grain sent away during so many years of culture, must have carried off this essential element to an extent sufficient to cause sterility. As the bones of animals are chiefly made up of phosphate of lime, they furnish a ready means of supplying the deficiency, and testing the accuracy of the induction. I made the experiment by giving to the soil a small quantity of ground bones, and the good results far exceeded my anticipations. By a moderate outlay of five or six dollars per acre, the soil was restored to almost primitive fertility. I was too happy in thus finding that my poor worn-out fields could be enriched without recourse to the ordinary bulky manures, the expenses of obtaining which in sufficient quantities put them out of the question. And all this could be achieved with great despatch, moderate outlay and comparatively little trouble. I went on to apply not only ground bones, but poudrette, and guano, which last abounds in the phosphate of lime combined with various other fertilizing ingredients. The neighbours came to see my fields, and were forced to acknowledge the successful results of my applications. They were at first a little timid in following my example, as thirty and forty cents per bushel for ground bones and poudrette, the ordinary prices of oats or corn, seemed a great deal to pay for manure. But when it came to guano, at two and three cents per pound, the timidity was not decreased. Struck, however, by the very favourable results of my experiments, they have been falling in very fast in the use of concentrated fertilizers. They seem to recognise the fact that it matters little how expensive the fertilizer may appear at first sight, provided it repays promptly the outlay, leaving the land improved. The extent to which this system may be carried, is only limited by the capital at command. I cannot help here introducing an anecdote, showing the kind of inferences drawn by some of the neighbouring farmers in regard to my proceedings. I had been in the practice of making mixtures containing as bases ground bones, poudrette and guano, and scattering portions in the corn hills. An old man who cultivated a little plot adjoining my cornfield, and who had been following the scourging system of tillage for about half a century, was struck by the luxuriance and increased yield of the land on my side of the fence. I happened one day in spring to be passing by his field, when I observed him distributing some kind of composition to his corn hills very similar to that I had been applying to mine. "What, John," said

I, "you seem to be following my plan; don't you know they call me a book farmer, and if your neighbours see you copying after me they will laugh at you." "Well," said John, in reply, "you may be a book farmer, *but you seem to have luck.*" So, according to honest John's view of my proceedings, I was entitled to rank with those proverbial for thriving through luck.

When I found that the use of ground bones, poudrette and guano produced such immediate benefits, paying usually for the outlay by the increase of the first crop, and often leaving a handsome profit over, I concluded that tenants who received half the produce raised ought of right to pay a part of the cost of these concentrated fertilizers. They were at little expense in hauling and distributing these, for which labour they were more than repaid by the increase of provender. I knew it to be customary in England for tenants to pay for a part or all of the manure bought to put upon their crops, and I thought if such a custom could be introduced where so many farms were in the hands of tenants, a liberal course on the part of landlords might tend to stop the depreciation of property in large sections of country, by arresting their progress to barrenness and poverty. I was but too well aware of the general indisposition among tenants to incur any expense in outlays for manure. But the results of experiments, tried under their eyes at my own cost, left them no longer to doubt that it would be to their interest to accept my proposition and pay a part of the outlay. They saw that it cost little, if any more, to till rich land than poor land, and that by putting their fields in a condition to yield double crops, they made their labour doubly productive, saving half the seed, half the expense of fencing and ditching, besides the gains in provender for cattle and refuse for manure. I knew that it required extraordinary inducements, and even indemnity in some form, to prevail upon the tenants to unite in my views, especially where the leases ran from year to year. So I promised them that in case they paid half the outlay for manures, and removed from the farm after having had but one crop off the manured part, I would return them one half of what they had expended. I went further, and agreed, that should they have received the benefit of two crops, I would still repay them one-fourth of the original outlay, but nothing afterwards. With the proofs I had placed before their eyes of the great and immediate benefits of the concentrated fertilizers, I found a ready acquiescence in the terms proposed. This system requires but extension, to resuscitate, and as it were, revolutionize the agriculture of a very large extent of country lying on the waters of the Delaware and Chesapeake bays, where the finest alluvial soils have been so long subjected to the scourging process of farming, and worked almost to death, but still remain capable, as I have shown, of being brought to a high state of productiveness by the outlay of a few dollars per acre, in the purchase of concentrated manures, containing the elements of fertility of which they have been robbed by crops sent away. Perhaps some caviller may say, "It is no news to tell us that ground bones form an excellent manure, since they have been extensively used for this purpose

in England, for many years." Should such an observation be made. I would reply that I lay no claim to the discovery of the uses of bone earth as a fertilizer, but am interested in showing the philosophy of its action, and the necessity of its presence in the soil.

Now, having, I trust, fully demonstrated—by pointing out the advantages derived from only a single fact furnished through chemical investigations—how scientific intelligence applied to agriculture may be *made to pay*, the true test as every one will admit, I will proceed to show how the lights of modern science may be put to profit in *saving money*.

What I have just stated, as the results of actual experience with ground bones, might tempt some of you who live in this vicinity to purchase and apply them to your own grounds. But I can save you from disappointment and considerable expense, by informing you before hand, that you will not reap the same advantages from the outlay, that have resulted in other places. It may be satisfactory to have the cause of the failure of ground bones to exert their conspicuous effects in this locality explained; and this, I think, can be done very satisfactorily through a knowledge of facts, developed by scientific researches. These have made known to us the presence of phosphate of lime, or bone earth, in stable and barn yard manures, with which the fields in the vicinity of Philadelphia have, for years and years, been constantly dressed. The ground, therefore, has never been left without a good supply of the phosphates, and the application of ~~more~~, although it may ~~and~~ *be* preserve the land in high condition, cannot be expected to show any very striking results.

There are other substances used with great advantage in some situations, which would not compensate the farmers in this vicinity for the expenses of purchase and application. Among these, I will merely mention ashes, and the green sand marl of New Jersey and Delaware, both of which are so beneficially used upon the alluvial soils of those and other States. The causes of this failure may be thus explained. The ashes and the green sand contain potash, one of the substances most grateful to growing plants. With the exception of the alluvial plain, upon which most of the city stands, the region about Philadelphia, on the west side of the Delaware, presents what geologists call the old formations, with rocks consisting of granite, and mica, or isinglass. Now, the felspar entering into the composition of granite has been analysed, and found to contain a large proportion of potash. The same may be said of mica; and the slow decomposition of these minerals keeps the soil supplied with all the potash needed by vegetation. Hence, the addition of potash from other sources is quite superfluous, and farmers need not throw away good money in the purchase of materials already furnished them in sufficient abundance by nature.

Every one at all acquainted with British husbandry, from seeing or reading, must I think admit that it yields more to the arable acre than our own. Of this a sufficient proof appears to be furnished, by the high rents English tenants are enabled to pay, namely, from \$25 to \$50 per acre, added to which are numerous taxes, poor rates, and

often a part or all the cost of the manures purchased. Thus the British tenant pays more for the use of a farm, than the average price for the fee simple of improved land in our country. Among us, few who purchase farms expect to pay for them by the produce of a single year. But the English farmer must make more money than would do this, in order to pay his annual rent of \$25 or \$50 per acre, buy manures, pay taxes, and support a family. He must then be able to apply capital and labour upon land to much greater advantage than the generality of American farmers. It may be said that his good home market, and the cheapness of labour, give him singular advantages over the American farmer. But the latter, it must be remembered, is at a small expense for his land, and has very little to pay in taxes. The difference in the price of produce does not appear to us sufficient, to explain the reason why the British farmers are able to obtain so much more from their acres than we usually get from ours. We have well authenticated accounts of their raising 50, 60, and 70 bushels of wheat to the acre, and the average over the whole kingdom is more than 30 bushels. The potato crop averages between 300 and 400 bushels per acre. In good faith, therefore, we ought not to withhold from them the merit of superior management, in the employment of capital for agricultural purposes.

The outlays incurred by English farmers in putting in their crops, and defraying other farming expenses, appear to us enormous, and will scarcely be credited, generally, on this side the Atlantic. In regard to the capital required to carry on a farm, as a general rule, \$25 per arable acre is considered sufficient in the chalk lands of Hampshire. But on some of the rich and highly cultivated soils of Surry, Kent and Essex, \$50 per acre is not too much. Grazing farms require less in proportion than arable lands. In Scotland, Professor Low estimates the capital required, for the first year, on a farm of 500 acres, at about \$17,500, from which \$5000 being deducted for produce sold within the year, leaves the net capital of \$12,000, or \$25 per acre. Among the items of expenditure enumerated, are \$2,400 for implements, \$1,400 for seeds, \$2,600 for manures, \$7,000 for live stock, and \$2,600 for labour.*

Tenants are bound to maintain, and to leave, the land in a high state of productiveness; and in case of neglect to do so, would be liable to a suit for damages.

To carry out this system, it is customary for a new tenant to pay the one removing, the expenses incurred in putting in his crops, and the purchase of manures applied within a certain time. Regular appraisers are appointed for districts, whose duty it is to make a valuation, and fix the amount which an incoming is to pay to an outgoing tenant. In an appraisement of the property of a tenant, removing from a farm of 310 acres in the county of Surry, held upon the terms of a lease stipulating that at leaving the landlord or incoming tenant shall pay for the turnips, leys, seeds sown, and crops in or on the ground, ploughings, dressings, half-dressings, fallows, half-fallows,

* See Johnson's Farmer's Encyclopedia. article *Capital*.

and preparations of the land for manure, and underwoods, according to their growth, and all other matters and things according to the customs of the county. The gross amount which the outgoer was to receive from the incomer, is set down at \$8,500! Among the numerous items of the appraisement, we notice the following:—For 17 acres in Swedish turnips in the ground, \$900, or more than \$50 per acre: for 8 acres of wheat, after a clover ley (valued at \$15 per acre), \$200, or \$25 per acre, in the ground: for 14 acres laid down in mixed grass seeds, and dressed with 240 loads of manure, at 75 cents per load, \$110, or nearly \$80 per acre: 7 acres in potatoes are estimated at 49 tons, and valued at about \$600 in the ground.*

Such statements show the courage with which English farmers grapple with their difficulties, and contend successfully against the enormous rents and exactions to which they are subjected. They furnish lessons, calculated to stimulate our more timid farmers to greater exertions, and inspire all with confidence in the success of spirited and judicious agricultural operations.

I have made these comparisons and concessions, with no invidious feelings towards my countrymen, for I know full well their capacities to cope with any other people under the sun in useful pursuits, when they have had opportunities of gaining information. I could name personal friends whose agricultural efforts have been crowned with marvellous success, and whose farms are the ornaments of neighbourhoods; I have examined with a comparative eye the agricultural implements furnished by American ingenuity, and feel a pride in declaring my belief in their general superiority in efficacy and cheapness of construction. Our ploughs, it is true, are not usually made entirely of iron; but I have seen them do much better work than those that were, and which cost eight times more than our wooden-framed ploughs. Being made of a perishable material affords to ours the rather singular advantage of wearing out soon, so as to give place to the newest improvements, sure to be at hand.

In this country, where land is comparatively cheap, there would seem to be a much greater disposition to add acre to acre, than to make each acre yield double or treble its ordinary produce.

It is certainly a golden rule for farmers, *to till no more land than they have capital to farm well*. The general anxiety for large occupations, betrays many into the error of tending a greater quantity of ground, than they have the means of managing to advantage. Some engage with the delusive hope of acquiring those means by future savings; others are actuated by the vanity of holding more land than their neighbours. The common results are deficiency of stock, imperfect tillage, scanty crops, with all the consequent train of rent in arrears, wages ill-paid, and debts unsatisfied,—distress, duns, and final ruin.

Gentlemen, as members of this Society, our main object is the promotion, by every means in our power, of the great interests of agriculture within our immediate locality. As citizens of a great

* Johnson's Farmer's Encyclopedia, article *Appraisement*.

State, possessing almost unlimited physical resources, we may, however, be permitted on an occasion like the present, to glance at the condition of its wide extended population, and see whether any obstacles can be discovered, calculated to check the extension of useful information and its ameliorating influences.

It cannot be disguised, that among a large portion of the rural population of Pennsylvania, a prejudice exists against education, so that collegiate courses have not only been greatly neglected, but even common schools poorly encouraged. A notion seems to have prevailed, that book-learning was inimical to agricultural pursuits. So, many rich farmers have kept their sons at home, to feed their cattle, make their crops, grovel in the bliss of ignorance and the indulgence of vulgar intercourse. Certainly, a young man, who by some fortuitous circumstances had obtained the high privileges conferred by ample opportunities of instruction, would be ill at ease among the ignorant boors with whom he would be thrown on his return from college. He would find in them no congenial associates, and might, probably, in the despair of an active mind, deprived of proper resources and thirsting for excitement, be driven to the tavern to obtain the means of drowning rational thought, in physical indulgence.

If such was to be the common fate of the sons of our farmers, no wonder that prejudices should exist against education. But this unhappy condition of things could only subsist whilst the instructed were few and far between. Go on educating until the country shall be well stocked with young men of intelligence, and these will certainly fraternize. Few will have recourse to the haunts of intemperance and vice, who once become acquainted with the higher pleasures derived from intellectual sources. They will learn from the teeming press what good is doing elsewhere, and be stimulated to imitation. They will form clubs or other associations for the diffusion of information and mutual improvement, and soon prove the falsehood of the notion, that in mental cultivation there is any thing inimical to the practice of agricultural pursuits. They will demonstrate the direct contrary—namely, that no other employment is more benefitted by the lights of intelligence and of sound science than agriculture, and that, in common parlance, science applied to agriculture may be made to pay. I must again observe, that in all this I am not indulging in the freedom of fancy, presenting views of things that might be desired, but which cannot be. Some portions of our country, I am proud to say, furnish abundant examples of the happy blending of intellectual culture with rural pursuits. Yes, north and south, east and west, exhibit neighbourhoods where, at the present day, the scholar and practical farmer are combined to form the most useful of citizens, and noblest of characters.

The extension of education and scientific intelligence is not only desirable as the means of increasing the efficiency of useful exertions—multiplying comforts and enjoyments, and I may even add, prolonging life. It has become a matter of absolute necessity. At the present time there is a great struggle going on in the civilized world,

and the most intelligent and active minds in all countries are at work, producing wonderful results upon the affairs of men. The progress of discovery and improvement in the useful arts, is such as to cause all who do not keep up with them to fall immeasurably behind. Those who manufacture cheapest, or raise the necessaries of life at the least cost, must come into the markets with superior advantages. Even at home, the increased facilities of transporting to our eastern ports the production of the new and rich soils opened to culture in the west, are bringing against us a fearful competition. We are thus driven to the necessity of finding out means to arrest further exhaustion, and increase the productiveness of our lands; and the aids of science, if not absolutely necessary to effect these objects, will, I believe, help us greatly to conduct agricultural pursuits to the best advantage.

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